ORIGINAL ARTICLE

Retention of information by emergency department staff at ambulance handover: do standardised approaches work?

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Background: Ambulance crews usually have just one opportunity to convey information about their patients to emergency department (ED) personnel. ED staff receiving patients from ambulance crews will naturally be focussed on their own initial assessment of the patient, which often distracts them from listening carefully to the ambulance crew's handover. Important information may be lost after the ambulance crew leaves.
Methods: Current handover practice was evaluated in two large EDs. A structured DeMIST format for verbal handover of pre-hospital information from the ambulance crew to receiving ED staff was then introduced into one of the departments. The number of packets of information in each verbal handover and the accuracy of ED staff's recall was assessed.
Results: 56.6% of the information given at verbal handover by the ambulance crews was accurately retained by ED staff before the introduction of DeMIST. Only 49.2% of the information given at verbal handover by the ambulance crews in the DeMIST format was accurately retained by ED staff.
Discussion: Communications training, clinical team leadership and team discipline must support the communication process between ambulance crews and the ED team to ensure that important pre-hospital information is not lost or misinterpreted. Electronic patient report forms are currently under development and may provide a partial solution for the transfer of accurate pre-hospital information to ED staff.

Effective communication lies at the very heart of good patient care.[1] Handover of care is one of the most important activities in medicine; if not done properly it can also be the most dangerous. Communication failure is often cited as a major contributory factor to subsequent error and harm to patients. In the BMA guidance document *Safe handover: safe patients*, staff are advised to avoid multiple concurrent conversations between individuals and let one person speak at a time, thus reducing the opportunities for conflicting information to be given.[2]

A survey of the perceived quality of patient handover by ambulance staff in the resuscitation room in Ninewells Hospital, Dundee found that 19.4% of ambulance staff had received formal training in giving a handover; 83% believed that there was some room for improvement.[3]

Good handover practice protects the safety of the patient, promotes continuity and quality of care and reduces repetition of pre-hospital information. Good handovers also help staff, provide professional protection, reduce stress and help the development of team communication skills.[2 4]

Ambulance crews usually have just one opportunity to convey information about their patients to emergency department (ED) personnel.

ED staff receiving patients from ambulance crews will naturally be focussed on their own initial assessment of the patient, which often distracts them from listening carefully to the ambulance crew's handover. This may be a particular problem when the patient is critically ill. Some ED staff will often be keen to dispense with the ambulance crew and attend to the patient themselves.

Any information that was not handed over verbally, not recorded on the patient report form or not retained by ED staff may be lost forever after the ambulance crew leave.

Current advice to UK ambulance crews on patient handover is provided in just one short paragraph in the *Ambulance Service paramedic training* manual[5]: crews are advised that they should convey details on the patient's history, vital signs and state, treatment and the patient's response to that treatment. There is no specific advice on how to structure the handover.

There have been some attempts to add structure to the process of patient handover. The American *Mosby's paramedic textbook* advocates the SOAP system[6]:

- **S**ubjective data – symptoms, past medical history and allergies
- **O**bjective data – examination and vital signs
- **A**ssessment –clinical impression of the patient
- **P**lan for patient management.

In South Africa, the MIST system has been adopted from a model developed by Professor Tim Hodgetts in the UK (K Boffard, Johannesburg Trauma Unit, personal communication):

- **M** – Mechanism of injury/illness
- **I** – Injuries (sustained or suspected)
- **S** – Signs, including observations and monitoring
- **T** – Treatment given.

Current handover practice was evaluated in two large EDs. A slightly modified MIST model (patient Demographics was added to MIST to produce DeMIST) was then evaluated in one of these departments to test the hypothesis that the DeMIST handover system improves retention of information by ED staff following ambulance handover and to compare the efficacy of this against the previously unstructured method.

METHODS

This was a two-stage, prospective, observational study.

Stage 1

Ten unmodified ambulance handovers were observed in two EDs (Birmingham Heartlands Hospital and The Royal London Hospital). The handovers were recorded with a dictation

Table 1 Accuracy and extent of handover information recall by ED staff at the two hospitals

Site	Completed handovers (recording and questionnaires)	Average number of information packets given by crew (range)	Average number of packets recalled by ED staff (range)	Average accuracy of recalled packets of information (range)
Heartlands	8	8 (2–16)	4.4 (2–8)	56.1% (30–83.3%)
Royal London	10	12.2 (9–15)	6.8 (3–9)	57.1% (23–80%)
Total	18	10.1	5.6	56.6%

machine. Local ambulance services were pre-warned that some handovers were to be recorded and individual permission was sought for each.

After recording, the crew member delivering the handover was asked to complete a short questionnaire to explore current handover practice (appendix 1).

The ED staff member who had received the patient was also asked to complete a questionnaire after initial management of the patient. This sought to identify retention and accuracy of information recall from the verbal handover.

The number of packets of information in each verbal handover recorded on the dictation machine were counted. The number of packets of information provided by the ambulance crew were compared to the number of those packets recalled by ED staff. These were then assessed for accuracy.

Stage 2

At the Heartlands site, 10 consecutive ambulance crews were asked to structure their verbal handover into the DeMIST format prior to their delivery to hospital staff. These handovers were recorded on a dictation machine. The ambulance crews and receiving hospital staff completed questionnaires in the same way as in the unmodified observed handovers in stage 1. The number of information packets recorded and those recalled by emergency staff were counted and subsequently analysed for accuracy.

Examples of unmodified and DeMIST handovers are presented below in the Qualitative data section.

RESULTS

Stage 1

Heartlands Hospital

Thirteen crews were approached (three declined to be recorded). Ten unmodified handovers were witnessed and recorded. From these 10, ambulance crews and ED staff completed eight questionnaires. Only two of the receiving medical staff and six of the ambulance crews reported that they had received training on handovers.

The Royal London Hospital

All 10 crews approached agreed to participate. Questionnaires were completed by ED and ambulance crew staff for the 10 witnessed handovers. Nine of the ten ambulance crews reported that they had received formal training on patient handover. None of the ED staff at The Royal London Hospital had been given training on receiving patients.

Overall, 56.6% of the information given at verbal handover by the ambulance crews was accurately retained by ED staff (table 1).

Stage 2

Ten consecutive ambulance crews were approached at the Heartlands site and asked to deliver their handover in a DeMIST format. All agreed to be recorded during this structured handover.

The number of information packets delivered in the DeMIST format are summarised together with the accuracy of recall by receiving hospital staff (table 2).

ED staff accurately retained 49.2% of the information given at verbal handover in the DeMIST format by the ambulance crews.

Qualitative data

Example of an unstructured handover

> ''From a nursing home. …..last evening, not sure exactly of the timing. Diagnosis chest infection. She was given amoxicillin. She had two doses at the nursing home. The nursing home staff noticed her deteriorate rapidly. And when we got there she was bubbling away merrily, sats were 62% initially on air and her bp was 83 over (unclear) which have dropped to 79 over 53. We've given her 40 milligrams of frusemide but I haven't put any fluids up because her blood pressure is too low. (unclear) …. It was 11.49, she's well known locally…. (ED staff: what was her GCS?) I can't get any pain or verbal or any threshold whatsoever. I've given some salbutamol to help with the bubbling, 40 milligrams of frusemide. Sats have come up to 88% on arrival at the hospital. ….. She's got Parkinson's and arthritis. (ED staff: how well is she usually?) normally up and about but mobility a bit limited (ED staff: Is she able to walk?) her mobility is limited, (ED staff: eating drinking?) she hasn't been drinking these last few days. Went out to her last night he diagnosed a chest infection. Her bp was 76 over 61 which we find very strange. Her name's xxxxx.''

Example of DeMIST structured handover

> ''17 year old, hit by a bus on the Stratford road in to Shirley. Obvious head injury, query knocked out for a few seconds

Table 2 Accuracy and extent of handover information recall by ED staff at Heartlands using the DeMIST format

Completed handovers (recording and questionnaires)	Average number of information packets given by crew (range)	Average number of packets recalled by ED staff (range)	Average accuracy of recalled packets of information (range)
10	10 (7–15)	4.9 (0–8)	49.2% (0–87.5%)

and then fitted on scene as well. When I got there he's very agitated. No pain in the neck, chest clear, equal breath sounds both sides. Abdo nice and soft. Pelvis is fine. Legs, arms fine. And his GCS has increased to 15 on the way in, put a line in ….saline cause his bp has been dropping slowly, 140 systolic, was 170 on the way in. Normally fit and well, no medications. Heart murmur from birth. Laying in prone position when found. Agitated and lower GCS.''

DISCUSSION

Patient handover is a crucial part of initiating care in EDs. Failure of ED staff to absorb key information from ambulance crews may result in the loss of vital pre-hospital information and may initiate inaccurate ''Chinese whispers'' as more clinical staff become involved in patient management. Some authors and educators have advocated the use of a structured handover to facilitate an orderly transfer of information from ambulance crews to receiving hospital staff.

The human brain's short-term memory can retain 7 ± 2 packets of information for 15–45 s before transfer to long-term memory.[7] The transfer of information to long-term memory can only occur when the individual is able to concentrate on the processing of the information from the short-term memory.

In the ED, this process may well be compromised by the distraction of looking at a newly-delivered patient, as well as by stress and fatigue. The inability to focus attention, for whatever reason, on the crew handing over is likely to mean that information is lost, which could be being demonstrated by the low percentage of information retained by ED staff in this study.[7]

Other methods must be used to ensure that important pre-hospital information is not lost. This should include accurate written information provided by the ambulance crew to form part of the patient's hospital record combined with accurate recording of verbal information by one of the ED staff acting as the scribe of the receiving clinical team.

We have conducted a small study to assess a verbal handover model. We did not control for staff seniority or experience, team composition, patient severity or nature of presentation. Patients ranged from critically ill trauma patients to more minor cases delivered by ambulance.

Due to the number of patients arriving at the ED, only a small sample was selected in order to evaluate handover without delaying other patients and staff.

The average accuracy of packets of data retained by the ED staff in the structured DeMIST handovers was 49.2%, which was worse than the accuracy from the unstructured handovers (56.6%). Due to the small study numbers it is not possible to determine the statistical significance of this data, however trends can be identified. The ED staff may have faired worse in the structured handovers due to the distraction of the ambulance staff who were trying to handover their patient using an unfamiliar system.

Notwithstanding the limitations of this study, it seems that there may not be an obvious advantage for ED staff retention of information in using a structured handover, such as DeMIST, alone. A structured model may offer other advantages, but does not, it seems, improve ED staff information recall. While we failed to prove our hypothesis, the effectiveness of a structured handover system will need to be determined in a larger study after improvements to inter-service communications training. We feel that further time for the ambulance crews to become familiar with the DeMIST handover structure may have led to a different outcome.

Electronic patient reporting forms that transmit clinical information together with scene images to the hospital before the patient's arrival are currently under trial (personal communications SAFETRIAGE system and Connecting for Health). These devices, once introduced, may improve the accuracy and retention of pre-hospital information provided to hospital staff.

Pending the introduction of these devices, communications training, clinical team leadership and team discipline must be developed further to support the communication process between ambulance crews and the ED team.

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APPENDIX 1

QUESTIONNAIRES FOR AMBULANCE CREWS AND ED STAFF

Ambulance staff questionnaire

1. What is your current role/job title? .....
2. How long have you held this role? .....
3. Have you received any formal training in the handover of patients to emergency department staff? (please circle most appropriate answer)
   Yes No
   Was that training:
   - Very poor
   - Poor
   - Average
   - Good
   - Very good

   How could it be improved? .....
4. From the last handover what do you feel were the most important pieces of information? .....
5. Was the quality of this handover
   - Very good
   - Good
   - Average
   - Poor
   - Very poor

   Please give reasons for your answer .....
6. What additional information are you often asked for? .....
7. What common problems do you encounter during handover? .....

Medical staff questionnaire

1. What is your current role/job title? .....
2. How long have you held this role? .....
3. Have you received any formal training in receiving the handover of patients from ambulance staff? (please circle most appropriate answer)
   Yes No
   Was that training
   - Very poor
   - Poor
   - Average
   - Good
   - Very good

4. For the last patient handover please can you recall as much information as possible in the space below, without formally identifying the patient concerned:
   .....
5. What additional information do you often ask for? .....
6. What common problems do you encounter during handover? .....